

ITEM 1: BOILER ANNUAL INSPECTION

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1 SCOPE

The intent of this item is to conduct the annual inspections on the auxiliary boilers.

Government Furnished Property: None

2 REFERENCES

Coast Guard Drawings:

282-WMEC 845-003, Rev -; BOOKLET OF GENERAL PLANS

Applicable Documents:

NAVSEA 0951-LP-018-8010, Auxiliary Boiler Cyclotherm NC-2500 - CGC ALEX HALEY
Naval Ships' Technical Manual, Chapter 221, 4, Boilers, 12/31/2000

3 REQUIREMENTS

3.1 GENERAL

3.1.1 In the presence of the Coast Guard Inspector, inspect and test all equipment and systems that will be disturbed during the performance of this work to document their original condition. Submit a Condition Found Report for all such equipment and systems noting any existing (pre-work) discrepancies in their operation.

3.1.2 Tag-Outs – Secure, isolate, and tag-out all affected mechanical, piping, and electrical systems.

3.1.3 Interferences – The Contractor shall remove, modify, or protect all interferences to the work. All interferences that are removed shall be tagged to facilitate proper reinstallation. Ensure that all removed equipment is kept in a clean, dry, protected location. Obtain verification from the Coast Guard Inspector for the protective measures taken for equipment not removed.

3.2 INTENT

3.2.1 The cutter is equipped with two (2) Cyclotherm Model MC-2500 fire tube type auxiliary boilers. The intent of this item is to conduct annual inspections on each of the boilers and to make needed repairs. The boilers are manufactured by Cyclotherm, Model NC-2500s. The contractor will need to obtain the services of a company specializing in boiler repairs, such as Industrial Boiler & Controls (907) 562-2827 or Seattle Boiler Works (206) 762-0737 to perform the inspection detailed below.

3.3 GENERAL GUIDANCE

3.3.1 Where valves are removed, install blank flanges with gaskets over the pipe openings, securing with at least four bolts, 90 degrees apart for valves with flanged connections. The blank flanges shall be at least 1/4" thick. For valves without flanged connections, install cap to pipe openings. Temporarily disconnect any remote operators and piping attached or connected to affected valves.

3.12 OVERHAUL AND TEST BOILER SAFETY VALVES

Each boiler is equipped with one (1) safety valve. The boiler safety valves are manufactured by Kunkle Valve Co., size 1-1/2" x H x 2 1/2". The valves are cast steel and are set at 150 psig.

3.12.1 Disconnect and remove the steam safety valve from each boiler.

3.12.2 At a suitable testing facility, disassemble, clean, inspect, overhaul, pressure test, and set the safety valves to the lifting pressure indicated in the technical manual.

3.12.2.1 Inspect all valve openings for obstructions and damage to the valve seat, disc, and body.

3.12.2.2 Clean the valve of foreign matter including, but not limited to, dirt, scale, rust, grease, and marine growth. Clean valve discs and seats to bright metal without injuring parts.

3.12.2.3 Check valve stem for trueness and realign them as necessary. Straighten stem to within 0.002 inch total indicator reading, as required. Polish stem to a 32 Root-Mean Square (RMS) finish and remove raised edges and foreign matter.

3.12.2.4 Lap and spot-in metallic disc to seat to obtain a 360 degree continuous contact between the disc and seat. If additional work is required to achieve a continuous seat, such as building up by welding, submit a CFR. Verify proper valve seating by spotting-in with prussian blue in the presence of the Coast Guard Inspector.

3.12.2.5 Clean, chase, and tap valve stem threads and exposed threaded areas.

3.12.2.6 Dress and true gasket mating surfaces.

3.12.3 Reassemble the valve. Remove all packing and renew it in kind with new packing of the same size and type as that removed.

3.12.3.1.1 Renew seals, gaskets, packing, and disc nuts in kind and in accordance with manufacturer's specifications.

3.12.4 Bench Test Safety Valve

3.12.4.1 In the presence of Coast Guard Inspector, shop test and set the valve to the correct lifting pressure as specified in the referenced drawing. Using saturated steam as a test medium, simulate system temperature and pressure, and bring the test pressure to 10 psi below the relief or safety valve operating pressure. Slowly raise the test pressure to the set relief or safety pressure setting, and record the pressure where the valve provides relief or the safety valve lifts. Additional information about relief valve testing can be found in paragraph 505-9.18 of NSTM Chapter 505.

Note: During testing and relief valve setting, do not allow the test pressure to exceed the safety valve set point by more than 10 psi for longer than a few seconds.

3.12.4.2 Reset and retest the valve if the valve does not function properly. If Safety or Relief valves are found to require additional repairs or renewal, submit a CFR.

3.12.4.3 Provide the Coast Guard Inspector with Condition Found Report documenting the test pressure and relief pressure (lifting pressure) for the valve. Affix a metal tag (brass plate), using lock wire, to the valve showing the following information:

Ship name and hull number.

Valve number or identification.

Valve lifting pressure.

3.3.2 HYDROSTATIC TESTING - Where required by later portions of this specification item, valve hydrostatic testing will be performed as described below.

3.3.2.1 Hydrostatic tests of the valve body/shell will be conducted with the valve in the open position to 150% of system operating pressure (but not less than 50 psig, otherwise see Table 505-11-1 of NSTM Chapter 505 for applicable pressures) for 3 minutes. Allowable leakage - none.

3.3.2.2 Hydrostatic tests for seat tightness will be conducted with the valve in the closed position (in the direction tending to open valve) with opposite side open for inspection. Test shall continue for three minutes, if there is no evidence of leakage or, in the event of visible leakage, until accurate determination of leakage can be made. Seat tightness test pressure shall be the normal operating pressure but not less than 50 psig, otherwise see Table 505-11-1 of NSTM Chapter 505 for applicable pressures. Maximum allowable leakage rate for metal to metal seated valve: 10 cubic centimeters (CC) per hour, per inch of nominal pipe size.

3.3.2.3 Valves which have been overhauled and which fail to pass the hydrostatic and tightness test leakage/tightness criteria shall be overhauled, again and tested at the Contractor's expense. Valves which fail the second test may be the subject of a contract change. Renewal valves which fail to pass the hydrostatic and tightness test leakage/tightness criteria shall be renewed with new valves and tested at the Contractor's expense.

3.4 WORK RESTRICTIONS

3.4.1 No restrictions on boiler work. Cutter has electric heating and galley services as backup for steam, so boilers are not normally operated inport.

3.5 PRELIMINARY HYDROSTATIC TEST

3.5.1 Remove the boiler front and rear covers and burner assembly as required to allow access to the boiler tube sheets for inspection.

3.5.2 Fill the boiler and conduct a preliminary hydrostatic test at 100% of design pressure to identify leaking tubes.

3.5.3 Identify each leaking and each plugged tube in the boiler. Document each leaking or plugged tube on a copy of the tube sheet drawing from the technical manual. Submit a condition found report to the Coast Guard Inspector.

3.6 PREPARATION FOR BOILER INSPECTION

3.6.1 Drain the boiler. Dispose of the boiler water in accordance with all related local, state, and federal regulations. It is anticipated that approximately 250 gallons of treated water will be drained from each boiler.

3.6.2 Disassemble the boiler to allow complete access to the boiler firesides and water sides. This will require removing the front and rear covers, the burner assembly, and any other appurtenances that interfere with these removals. Remove the hand hole plates, the wash-out plugs and the water column connections.

3.6.3 Wash the waterside interior of the boiler with clean, fresh water. Collect the wash water and properly dispose of it in accordance with all federal, state, and local regulations.

3.6.4 Remove lagging pads on the boiler nozzles, surface and bottom blow connections, boiler safety valve connections, and other off-stickers to allow for inspection. Reinstall the lagging pads after completion of inspections.

3.7 BOILER CLEANING

3.7.1.1 Mechanically clean the firesides of the boiler. Wire brush or otherwise mechanically clean the internal surfaces of the fire tubes. Remove all debris. Vacuum up and dispose of all soot.

3.7.1.2 Clean and inspect the low water cutoff.

3.8 BURNER HEAD INSPECTION

3.8.1 Disassemble and clean the burner heads.

3.8.2 Clean and inspect the burner nozzle.

3.8.3 Inspect the burner cone for damaged refractory.

3.8.4 Reinstall the burner head upon completion of other boiler repairs.

3.9 BOILER INSPECTION

3.9.1 Provide the service of a commercial boiler inspector certified by the National Board of Boiler and Pressure Vessels to perform a through inspection of each boiler, both internally and externally. Verify that the boilers are fit for continued service.

3.9.2 UT and PT Readings on Boiler Mounts

3.9.2.1 Boiler mount inspections are conducted as a part of the 5 year boiler recertification and are not a part of this specification item.

3.10 BOILER MANUAL VALVE RENEWAL

The boilers have several valves attached to mounts on the boilers. The boiler mounting valves are renewed as part of the 5 year boiler recertification item. No work is done on these valves in this item.

3.11 FEED SYSTEM AND FUEL OIL SYSTEM VALVE RENEWAL

The boilers have several valves associated with the boiler feed system and the fuel service system that will be renewed as a part of this specification item. Each of the valves listed below is to be renewed. Further information on the valves is given in the table below and in the technical manual for the boiler.

Pc. No.	Name	No. Req'd For 2 Boilers	Material	Manufacture	Remarks
49	Oil Solenoid Valve	2	Hall, Iron & Bronze	ITT Gen Controls	1/2" 120 Vac 60 Hz

Perform the work listed below on each of the valves listed in the table above. The quantities are for both boilers.

3.11.1 Disconnect the valves listed in the table above from the boilers. Valves are union end fitted in place. S/F has verified that valves are screwed in place, not welded or flanged.

3.11.2 Provide and install new valves to replace the existing valves. Install the new valves with new gaskets and seals.

3.11.3 Prior to installing the new valves, hydrostatically test each of the new valves in the presence of the Coast Guard Inspector. Conduct valve body hydrostatic test and demonstrate seat tightness on each valve. Test criteria are as discusses previously in this specification item.

Valve operating pressure.

Date valve tested and set.

Name and location of repair facility (Contractor).

3.12.5 Upon completion of shop work, remove blank flanges, pipe plugs, etc. and clean, dress, and true gasket mating surfaces.

3.12.6 Reinstall the overhauled safety valve in its correct location aboard the ship along with any removed piping or interferences in the presence of the Coast Guard Inspector. Renew gaskets and seals in kind. Use new flange bolting to reinstall the relief valve.

3.12.6.1 Adjust the remote operating gear and demonstrate that it operates smoothly to the Coast Guard Inspector.

3.12.7 VERIFYING SAFETY VALVE SET POINT

Note: Perform this work after completion of other valve work involved in this specification item.

3.12.7.1 Remove lock wires and tags, slowly open isolation valves, and inspect the relief valve for leaks with the affected system at normal operating pressure and temperature. No leakage is allowed. Correct any deficiencies found and retest.

3.12.7.2 Test operate the relief valve by raising steam system pressure to verify that the relief valve operates properly. The Contractor is responsible for correcting any leaks discovered in the disturbed working areas. Pop test the boiler safety valves after the valves have been reinstalled on the boiler. Ensure that the valves lift at the proper set-point.

3.12.8 Submit a Condition Found Report.

3.13 WATER LEVEL GAGE GLASS

3.13.1 Water level gage glasses are inspected during the 5 year boiler recertification. No work will be performed on them at this time. Report any discrepancies on a condition found report. Repairs will be the subject of a contract modification.

3.14 WATER LEVEL PROBE

Each boiler is equipped with four (4) water level probes. Three of the probes are located on a probe assembly at the top of the boiler. The fourth probe is in the low water bottle assemble on the front of the boiler. Perform the following work on the water level probes on each boiler.

3.14.1 Remove the water level probe assembly on the top of each boiler. Clean and inspect the water level probes. Clean and inspect the flange connection on the top of the boiler drum. Reinstall the water level probe assemblies using new gaskets upon completion of other boiler work.

3.14.2 Remove the water level probe in the low water level bottle on the front of the boiler. Clean and inspect the water level probes. Clean and inspect the flange connection on the top of the boiler drum. Reinstall the water level probe assemblies using new gaskets upon completion of other boiler work.

3.15 CALIBRATION OF PRESSURE GAGES

3.15.1 Remove the following pressure gages from each boiler. Transport the pressure gages to the shop. Calibrate each pressure gage. Affix a sticker to the inside of the face plate of each pressure gage showing the date the pressure

gage was calibrated. Return the pressure gages to the ship and reinstall them in their original locations. A total of eight (8) pressure gages, four per boiler is involved. The pressure gages are listed below:

Steam Pressure Gage

Fuel Oil Supply Pressure Gage

Feed Pressure Gage

Fuel Oil Return Pressure Gage

3.16 BOILER FEED PUMP AND MOTOR

3.16.1 No work will be performed on the feed pump and motor as a part of this specification item.

3.17 BOILER FUEL PUMP

The boiler fuel pump and the forced draft blower are driven by the same motor, which has a double ended shaft.

3.17.1 No work will be performed on the fuel pump as a part of this item.

3.18 ADDITIONAL BOILER REPAIRS

The contractor shall anticipate plugging three (3) tubes in each boiler which will be identified during the preliminary hydrostatic testing. Include the costs of plugging a total of six (6) boiler tubes as a part of the bid for this item.

3.18.1 Clean and lap each of the seating surfaces on the tube sheet where tube plugs will be installed.

3.18.2 Drill and ventilate each of the affected tubes.

3.18.3 Plug a total of six (6) tubes at various locations previously identified.

3.18.4 Provide an updated copy of the tube sheet reflecting the repairs accomplished in a condition found report. Show the location of each plugged tube.

3.19 ACCEPTANCE TESTING CRITERIA

3.19.1 Clearing Tags – As needed for testing, restore all affected systems and clear tags in accordance with the General Requirements.

3.19.2 Test Performance – All acceptance tests shall be performed in the presence of the Coast Guard Inspector. Provide a written report to the Coast Guard Inspector of all test results within one week of test completion.

3.19.3 Hydrostatic testing of the boilers will be conducted as described in NSTM Chapter 221. Lagging on the boiler casing will not be removed beyond what is directed by the specification item unless additionally directed by the boiler inspector. Any additional lagging removal will be subject of a contract modification.

3.20 HYDROSTATIC TESTING AT 150% OF DESIGN PRESSURE

3.20.1 The 150% design pressure hydrostatic test is performed as a part of the 5 year boiler recertification and will not be performed as a part of this specification item.

3.21 BOILER REASSEMBLY

3.21.1 Flush the boilers with distilled/demineralized water.

3.21.2 Reassemble the boilers. Reinstall all components using new gaskets.

3.22 ACCEPTANCE TESTING

3.22.1 Boiler 100% Tighness Test

3.22.1.1 Fill each boiler with distilled/demineralized water.

3.22.1.2 Conduct a final hydrostatic test on each boiler at design operating pressure. Ensure that there are no leaks and that all gaskets are holding tight.

3.22.2 Inspect Automatic Control System

3.22.2.1 Provide a service technician to service, inspect, and adjust the boiler automatic control system on each boiler.

3.22.2.2 Vacuum clean the boiler control cabinet.

3.22.2.3 Adjust each of the automatic controls.

3.22.2.4 Demonstrate to the boiler inspector and to the COTR that each of the automatic controls functions properly.

3.22.2.5 For bidding purposes, assume that 2 days will be required to adjust and service the automatic controls on each boiler, for a total of 4 days service time.

3.22.3 Operational Test – Verify proper operation of the components or systems affected by this work. During this testing, run the equipment through its full range of capabilities in all configurations and operating modes.

3.22.3.1 Ship's force will operate each boiler for a minimum of 4 hours. Demonstrate the proper operation of equipment during that period.

3.23 LAGGING REPAIRS

3.23.1 Restore lagging around the boiler mounts where it was removed. Pop rivet aluminum covers to the existing lagging aluminum cover to protect the new lagging.

3.24 RESTORATION

3.24.1 Prepare and paint all new and disturbed surfaces.

3.24.2 Restore all interferences to their original condition.

3.24.3 Clearing Tags – Restore all affected systems and clear any remaining tags.